ENVIRONMENTAL PROTECTION AGENCY REGION 1

PRELIMINARY ASSESSMENT DECISION RECORD FY 88

I. IDENTIFICATION	
01 STATE	02 S... NUMBER
MAD	980909493

II. SITE NAME AND LOCATION		
01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER	
South Station (Foundation Fill Disposal)	SUMMER STREET	
03 CITY	04 STATE	05 ZIP CODE
Boston	MA	02110

DRAFT PA: completed by ☐ FIT (FI-.....-...)
☐ State
☒ EPA
☐ _____

REVIEWED ☐ Site Name
☐ Site ID No.
☐ Existing File
BY _____

DRAFT PRIORITY ASSESSMENT/RECOMMENDATION FOR SITE INSPECTION

☐ High ☐ Medium ☐ Low ☒ None

SUMMARY OF COMMENTS ON DRAFT

a. STATE comments, dated ....., by .....

Summary _____

_____

b. SITE OWNER comments, dated ....., by .....

Summary _____

_____

c. EPA REGION 1 comments, dated ....., by .....

Summary _____

_____

d. ..... comments, dated ....., by .....

Summary _____

_____

FINAL PA DECISION BY EPA PA COORDINATOR:

a. ☐ agree with draft.
b. ☐ Revised draft. Reason _____

_____

c. Final Priority Assessment/Recommendation for Site Inspection

☐ High ☐ Medium ☐ Low ☒ None

d. Final decision made by Deborah J. Cancel Date 1/12/88

CERCLIS INFORMATION:

a. Site Discovery Date _____ (If not already in CERCLIS)
b. PA Start Date _____; Compl. Date 12/23/87 & FY 88 Quarter 1 2 3 4
c. Entry Date 12/28/87; Entered By MTM

S. RUSSELL SYLVA
Commissioner

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
5 Commonwealth Avenue
Woburn, Massachusetts 01801

MEMORANDUM

TO: Helen Waldorf, DHW, Boston

THROUGH: Stephen Johnson, DHW, NERO SJ

FROM: Patricia Rodden, DHW, NERO

DATE: December 1, 1987

SUBJECT:BOSTON - SOUTH STATION Preliminary Assessment

This Preliminary Assessment report has been prepared by a representative of the Massachusetts Department of Environmental Quality Engineering, (the Department) in partial fulfillment of obligations to the Environmental Protection Agency under the Multisite Cooperative Agreement.

SITE DESCRIPTION

South Station is an active railroad station located on Summer Street in Boston, Massachusetts. The site is bordered by Atlantic Avenue to the west, the rail yard to the south, and Dorchester Avenue and Fort Point Channel to the east. (Please refer to the site locus map, Figure 1.) The Massachusetts Bay Transit Authority (MBTA) is the current owner of the site and railroad operation.

HISTORY OF THE SITE

South Station has been a railway station since January 1, 1899. The station is presently a commuting center. The lines are not used for freight or industrial purposes. In the past, freight packages were shipped through the station. Mr. Jim Wright of the MBTA stated th did not think hazardous materials wre ever transported through the station.

The Department's involvement with the site began as the result of a South Station expansion project. The MBTA was planning to build hotel and office space. In order to do so, a significant volume of contaminated soil had to be excavated and removed from the site. The Department

developed a guideline which the MBTA and their environmental consultant could follow to properly characterize and dispose of the excavated soil.

NATURE OF HAZARDOUS MATERIALS

South Station holds no licenses or permits for the generation, treatment or disposal of hazardous wastes. However, the presence of hazardous materials, PAHs, has been documented on-site. This contamination is thought to be from the train operation on-site.

HAZARDOUS CONDITIONS, INCIDENTS, PERMIT VIOLATIONS

At the commencement of the South Station expansion project in 1985, the Department required the MBTA to hire an environmental consultant to properly characterize the soil that was to be removed. The soil samples were analyzed for priority pollutant volatile organic compounds (VOCs), acid extractable compounds, base/neutral extractable compounds, pesticides, herbicides and polychlorinated biphenyls (PCBs).

Base/neutral compounds, particularly polynuclear aromatic hydrocarbons (PAHs) were found to be the major contaminants in the soil. Copies of all laboratory data sheets in Departmental files are contained in the Appendix of this report. PAHs are associated with waste oil and are often formed as the result of the product of incomplete combustion of organic compounds. The samples with the highest levels of PAHs were collected near the bumper area of the tracks where the trains are left to idle. The contaminant concentrations were found to decrease with depth from the surface and with distance from the bumper. Due to the nature of the contaminants and their distribution, the source of the contamination is thought to be train operation, leaking oil and run-off.

As mentioned previously, the Department developed a guideline with regard to the disposal of PAH contaminated soil in response to this situation. At the time, it was thought the levels of contamination did not warrant any special attention and consequently soil containing less than 500 mg/kg PAHs was classified as solid waste. This policy is currently under review and may be amended. Limited aeration was allowed for VOC contaminated soil prior to landfill disposal.

POSSIBLE ROUTES FOR CONTAMINATION

There is no documentation of groundwater contamination on the site. PAHs, the most common contaminant on-site, are not highly volatile, nor are they highly soluble in water. Therefore, the contaminants present are not likely to migrate far from their location of deposition. It is possible that limited dispersion of the contamination via windblown soil, or erosion due to surface water run-off may occur.

POSSIBLE AFFECTED POPULATIONS, RESOURCES

There are no municipal or private drinking water supplies in the vicinity of South Station. The City of Boston is provided water from the Quabbin Reservoir, located in west-central Massachusetts and under the jurisdiction of the Massachusetts Water Resources Authority. Fort Point Channel, which flows into Boston Harbor, is located in close proximity. However, as mentioned previously, the extent and nature of the contamination is such that the only possible route of migration to the channel would be via erosion due to surface water run-off or windblown soil. It is unlikely that an appreciable amount of contamination from the South Station site would reach the channel.

There is potential for direct human contact for employees at the railyard and workers undertaking the excavation and removal of contaminated soils. Adequate health and safety precautions should be taken by persons coming in contact with the contaminated soils.

CONCLUSIONS/RECOMMENDATIONS

South Station is an active railroad. Consequently, small amounts of contamination related to daily operations of the yard are likely to be present in areas of train operation. The Department's involvement to date has been limited to providing the MBTA direction in the disposal of the oil/PAH contaminated soil removed as part of the construction project. As the EPA does not regulate oil or oil contaminated soil which constitutes the majority of the contamination at the South Station site, the writer recommends no further action at the subject site is warranted under CERCLA.

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

EPA

I. IDENTIFICATION
01 STATE: | 02 SITE NUMBER:

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
South Station	Summer Street				
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 COUNTY**	**07 COUNTY CODE**	**08 CONG DIST**
Boston	MA		Suffolk		

09 COORDINATES LATITUDE 42 21 10.0 | LONGITUDE 71 04 05

10 DIRECTIONS TO SITE (Starting from nearest public road)

Route 93 to the South Station Exit

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
Mass. Bay Transit Authority	10 Park Plaza		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
Boston	MA	02116	(617) 722-5000
07 OPERATOR (If known and different from owner)	**08 STREET** (Business, mailing, residential)		
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
			( )

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☒ F. OTHER: Authority of the Commonwealth (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES DATE ___/___/___ (MONTH DAY YEAR)
☒ NO

BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☒ A. ACTIVE ☐ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION
1/1/1899 (BEGINNING YEAR) | present (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Sampling and analysis of on-site soil revealed the presence of polynuclear aromatic hydrocarbons, (PAHs), oil and grease, and volatile organic compounds

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

State involvement was the result of excavation of contaminated soils during on-site construction. DEQE was to determine ultimate handling and disposal requirements.

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
Stephen Johnson	Department of Environmental Quality Engineering	(617) 935-2160
04 PERSON RESPONSIBLE FOR ASSESSMENT	**05 AGENCY** / **06 ORGANIZATION** / **07 TELEPHONE NUMBER**	**08 DATE**
Patricia Rodden	DEQE / DHW / (617) 935-2160	12 / 1 / 87 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A SOLID
- ☐ B POWDER, FINES
- ☐ C SLUDGE
- ☐ D OTHER _____ (Specify)
- ☐ E SLURRY
- ☐ F LIQUID
- ☐ G GAS

02 WASTE QUANTITY AT SITE
(Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS _____
NO OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- ☐ A TOXIC
- ☐ B CORROSIVE
- ☐ C RADIOACTIVE
- ☐ D PERSISTENT
- ☐ E SOLUBLE
- ☐ F INFECTIOUS
- ☐ G FLAMMABLE
- ☐ H IGNITABLE
- ☐ I HIGHLY VOLATILE
- ☐ J EXPLOSIVE
- ☐ K REACTIVE
- ☐ L INCOMPATIBLE
- ☐ M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	PAH contaminated soil				

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references e.g., state files, sample analysis, reports)

DEQE Files, Northeast Regional Office, Woburn Mass.

Jim Wright, MBTA Boston phone (617) 722-3360

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED. _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED. _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: _____
02 ☒ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Soil sampling and analysis has documented the presence of VOCs and PAHs.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE. _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

There is a chance of direct human contact with the contaminated soil for persons working at the railyard.

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE. _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills/runoff/standing liquids/leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

There is no documentation on file to indicate the site is impacting any of the above.

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

DEQE files, Northeast Regional Office, Woburn Mass.


Boston, South Quadrangle
SOMERVILLE
CAMBRIDGE
East Cambridge
Charlestown
Old Ironsides
Drydocks U.S. NAVAL RES
Charlestown Bridge
Coast Guard Station
SUMNER TUNNEL
CALLAHAN TUNNEL
MBTA TUNNEL
Charles River Dam
Locks
Mass General Hospital
North Sta
Old North Ch
Jr High Sch
Cem
Library
Fire Sta
Hosp
Courthouse
Playground
Central Square
City Hall Annex
Sennott Park
Kendall Square
LONGFELLOW BRIDGE
MASS INSTITUTE OF TECHNOLOGY
Charles River
RIVER Basin
Harvard Bridge
MIDDLESEX CO
SUFFOLK CO
Beacon Hill
State House
City Hall
Faneuil Hall
Customhouse
Post Office
Frog Pond
Boston Common
SITE LOCUS
South Sta
Fort Point Channel
Back Bay
Copley Square
Public Garden
Park Sq
Police Sta
High Sch
BOSTON UNIVERSITY
Kenmore Sq
INTERCHANGE 21
INTERCHANGE 22
INTERCHANGE 23
INTERCHANGE 24
TOLL ROAD
TNPK
MASS
Fenway Park
Audubon Circle
Emmanuel College
Back Bay Fens Park
Museum
Simmons College
NORTHEASTERN UNIVERSITY
Wentworth Institute
HARVARD MEDICAL SCH
Madison Park
Roxbury Crossing
Mission Church Sch
Timilty Sch
Parker Hill
Playground
Highland Park
Water Tank
Hale Sch
Roxbury
Washington Park
Notre Dame Academy
Hospital
Harris Park
Ellis Sch
Egleston Square
Boston Teck High Sch
Fire Sta
Eliot Cem
Orchard Park
Dearborn Sch
Blackstone Square
Franklin Square
Mackey Sch
Roich Playground
City Hospital
Southampton Fire Sta
INTERCHANGE 15
INTERCHANGE 16
INTERCHANGE 17
South Boston
Andrew Square
Columbia Park
Carson Beach
Radio Tower
National Shrine
Telegraph Hill
Columbus Circle
Everett Square
Uphams Corner
Columbia Sq
Winthrop Sch
Fenwick Sch
Everett Sch
Library
Hoyt Sch
High Sch
Playground
Park
Cem
Sta
PO
BOSTON

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
5 Commonwealth Avenue
Woburn, Massachusetts 01801

S. RUSSELL SYLVA
Commissioner

April 16, 1985

RECEIVED
APR 17 1985
J. F. WHITE

Mr. Stephen J. Barlow
J.F. White Co.
P.O. Box 240
Newtonville, MA 02160

Dear Mr. Barlow:

As per your letter of April 4, 1985, it is the Department's position that all surplus excavation material to be disposed of from the South Station construction project is to be classified as solid waste and removed to an approved sanitary landfill due to residual PAH contamination and the suspect nature of the site. Such disposal shall be in conformance with the stipulations of our previous correspondence regarding notification of local Boards of Health.

Very truly yours,

Richard J. Chalpin

Richard J. Chalpin
Acting Regional
Environmental Engineer

RJC/ae

cc: Peter McNulty, MBTA
Assistant Director of Construction
10 Park Plaza
Boston, MA 02116

GEOTECHNICAL ENGINEERS INC.
1017 MAIN STREET · WINCHESTER · MASSACHUSETTS 01890 (617) 729-1625

PRINCIPALS
RONALD C. HIRSCHFELD
STEVE J. POULOS
DANIEL P. LA GATTA
RICHARD F. MURCOCK
GONZALO CASTRO

September 19, 1984
Project 84291

Mr. Steve Barlow
J.F. White Contracting Co.
One Gateway Center
Newton, MA 02158

Subject: Base/Neutral Compounds in Soil Samples Collected at South Station Intermodal Transportation Center

Dear Steve:

Please find attached a sketch of the South Station Trackyard, showing the approximate locations of test borings advanced to obtain soil for chemical analysis.

Soil obtained from each boring was analyzed for priority pollutant volatile organic compounds, acid organic compounds, base/neutral compounds, pesticides, herbicides & PCB'S. In addition, samples were analyzed using the EP Toxicity method to evaluate metal concentration in leachate which could be generated by soil at South Station.

Laboratory analysis of the soil reveals that all samples are free of any priority pollutant compounds except base/neutral compounds.

The total concentration (in parts per million [ppm]) of Base/Neutral Compounds in each sample is as follows:

B-1	191.47	Track 7
B-2	26.35	
B-3	2.2	
B-4	229.47	Track 11
B-5	1.03	
B-6	88.93	
B-7	155.67	Track 17
B-8	1.25	
B-9	1.49	

Base/Neutral compounds include a group of chemicals referred to as polynuclear aromatic hydrocarbons (PAH's)., These compounds are present in the by-products of fossil fuel combustion and may comprise up to 10% of diesel fuel or other petroleum distillates. The greatest concentration of PAH's was detected in samples obtained near the bumper of the tracks sampled (samples B-1, B-4, and B-7). This is probably the result of runoff or leaks of fuel from locomotives which idle near the bumper.

If you have any additional questions regarding the analytical data collected by GEI, please do not hesitate to call.

Very truly yours,

GEOTECHNICAL ENGINEERS INC.

M. Margret Hanley

Margret M. Hanley
Geologist

Richard F Murdock

Richard F. Murdock, P.E.
Principal

MMH/RFM/alm
attachment

The Commonwealth of Massachusetts
Department of Environmental Quality Engineering
Metropolitan Boston - Northeast Region
838 - New Boston Street, Woburn, MA 01801

ANTHONY D. CORTESE, Sc.D.
Commissioner
727-5194
935-2160

September 10, 1984

Mr. Stephen J. Barlow
J.F. White Contracting Company
One Gateway Center
Newton Center
Newton, MA 02160

RE: MBTA South Station
Project Soil Classification and
Aeration Approval

Dear Mr. Barlow:

I have reviewed the most recent submittals from you and your consultants, Geotechnical Engineers, Inc. regarding analyses of a second round of samples from the South Station project.

All at the analytical data collected supports the decision that soil leaving South Station containing residual concentrations of polynuclear aromatic hydrocarbon (PAH's) may be classified as solid waste. In addition soils from South Station which contain less than 10 ppm of Volatile Organics may be classified as solid waste. Proper disposal options for these soils include:

1. Disposal of a site specifically established for this solid waste which has been assigned pursuant to M.G.L. Chapter 111, Section 150A, and approved by the Department in accordance with 310 CMR 19.00. The "Regulations for the Disposal of Solid Wastes by Sanitary Landfill".

2. Disposal at an existing approved landfill under the conditions that the material is used as a daily cover material in an area that will again be covered the next day during the normal operation of the landfill. Due to these handling requirements, the material is subject to 310 CMR 19.16 of the "Regulations for Disposal of Solid Waste by Sanitary Landfill". Such special disposal requires the permission of the local assigning agency which is usually the Board of Health of the community where the disposal is to occur.

3. Incorporation in the proper closure of an existing approved landfill under the conditions that it is covered with a proper final cover as prescribed in a DEQE approved closure plan.

In addition, I concur with the proposal to aerate soils at South Station which exhibit Volatile Organic Carbon concentrations between 10 and 100 ppm. The renovation area must be monitored a suitable distance downwind to ensure that ambient air quality is not adversely impacted by this operation.

Please call if you have any questions.

Very truly yours,

Richard J. Chalpin
Acting Regional Environmental Engineer

RJC/gg

cc: Dr. Helina Brown
DEQE
One Winter St.
Boston, MA 02108

GEOTECHNICAL ENGINEERS INC.
1017 MAIN STREET · WINCHESTER · MASSACHUSETTS 01890 (617) 729-1623

PRINCIPALS
DONALD C. HIRSCHFELD
STEVE J. POULOS
DANIEL P. LA GATTA
RICHARD F. MURDOCK
GONZALO CASTRO

5

October 19, 1984
Project 84291

RECEIVED
OCT 20 1984
J. F. WHITE

Mr. Steve Barlow
J.F. White Contracting Co.
One Gateway Center
Newton, MA 02158

Dear Steve:

Please find attached the results of chemical analysis of six surficial soil samples collected at the South Station Intermodal Transportation Center excavation site on September 24, 1984. The approximate location of each soil sample collected by Geotechnical Engineers Inc. (GEI) is shown in figure 1.

Soil samples were analyzed for US EPA Priority Pollutant Base/Neutral Organic Compounds by ERCO Inc. in Cambridge, Massachusetts. All samples were determined to contain measurable concentrations of various Base/Neutral Compounds.

All concentrations were reported by ERCO to be less than the average reporting limit (the smallest concentration which can be quantified) which varied for each sample. Table 1 summarizes the reporting limit for each sample, the Base/Neutral Compounds detected, and the maximum concentration of Base/Neutral Compounds which could be present.

The greatest concentration of Base/Neutral Compounds were detected in sample #1, at 1,350 parts per million (ppm). This concentration, although high, is less than the concentration of Base/Neutral Compounds which is expected to be present in soil saturated with 3% diesel fuel. (DEQE currently permits soil contaminated with up to 3% petroleum fuel products to be used as daily cover on state approved landfills.)

In previous sampling rounds at South Station, soil collected in areas proximate to the Station and rail bumpers, where trains idle, exhibited the greatest concentrations of Base/Neutral Compounds. Concentrations of Base/Neutral Compounds generally decrease to the south of the head house.

Concentration of Base/Neutral Compounds in soil collected on September 9, 1984 by GEI are greater than concentrations detected in samples collected previously. This is probably because soil samples described here represent conditions in surficial soil, which is most likely to be contaminated with petroleum fuel products. (Surficial soil will act in part as an adsorbent to fuels spilled in the ground surface.) In general, total concentrations of Base/Neutral Compounds should decrease with depth.

If you have any questions regarding the soil analysis data presented in this letter, please do not hesitate to call.

Very truly yours,

GEOTECHNICAL ENGINEERS INC.

M. Margret Hanley
Margret M. Hanley
Geologist

Daniel P. La Fetra
for Richard F. Murdock, P.E.
Principal

MMH/RFM/alm
attachments

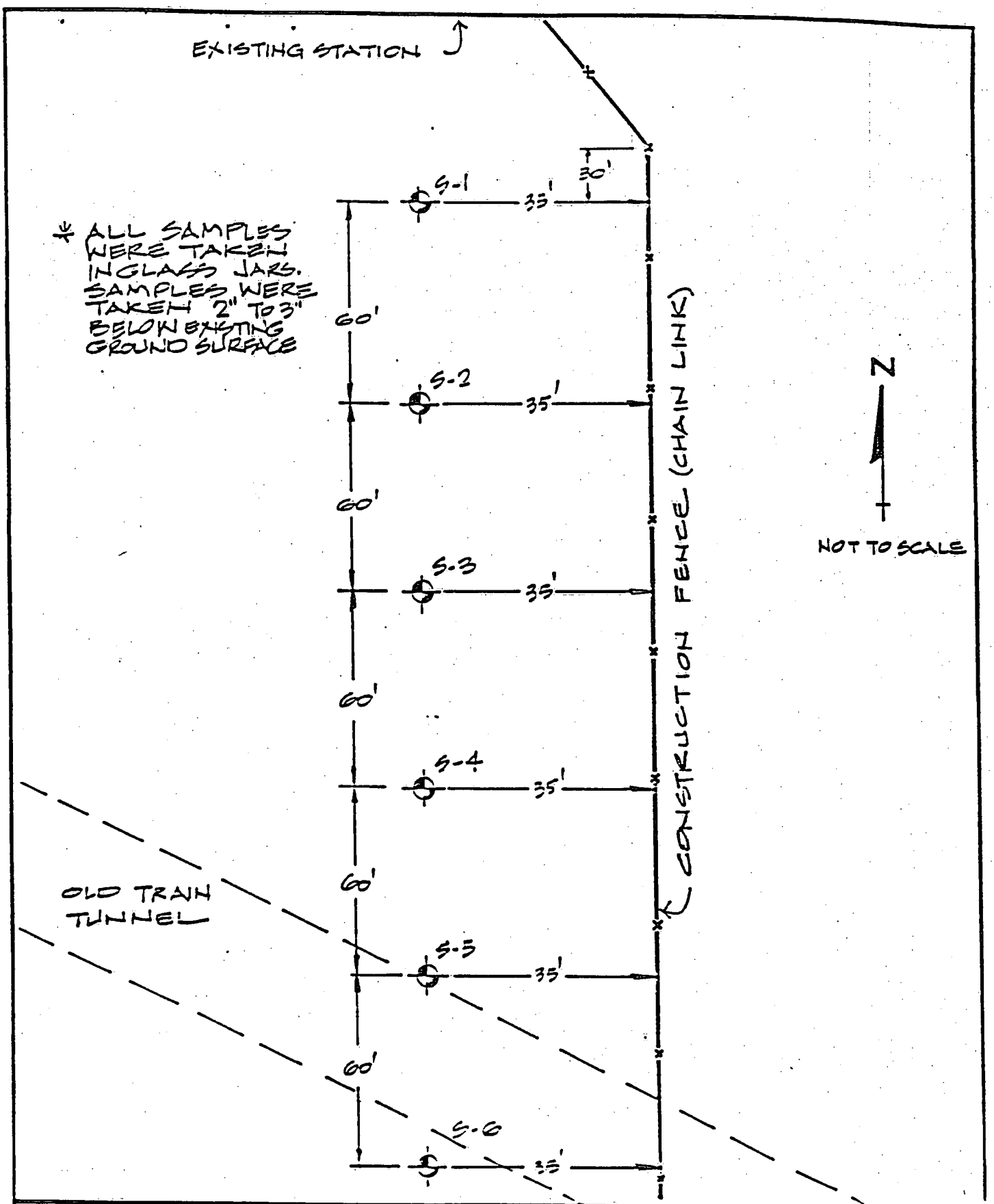
TABLE 1

SUMMARY OF BASE/NEUTRAL ORGANIC ANALYSIS
SOIL SAMPLES COLLECTED AT
SOUTH STATION INTERMODAL
TRANSPORTATION CENTER,
BOSTON, MASSACHUSETTS

September 24, 1984

Sample #	Reporting Limit (ppb)	Base/Neutral Compounds Detected	Maximum Possible Concentration (in ppm) of Base/ Neutral Compounds
1	270,000	Fluoranthene bis (2-ethylhexyl)- pthalate di-n-butyl phthalate di-n-octyl phthalate pyrene	1,350 ppm
2	100,000	Fluoranthene pyrene	200 ppm
3	290,000	Fluoranthene phenanthrene pyrene	870 ppm
4	47,000	Fluoranthene benzo(a) anthracene benzo(a) pyrene benzo(k) fluoranthene chrysene benzo(ghi) perylene phenanthrene pyrene	376 ppm
5	180,000	Fluoranthene phenanthrene pyrene	540 ppm
6	25,000	Fluoranthene benzo(a) anthracene benzo(a) pyrene benzo(k) fluoranthene chrysene anthracene benzo(ghi) perylene phenanthene indeno (1,2,3-cd)- pyrene pyrene	250 ppm

NOTES: Soils analysis performed by ERCO Inc., Cambridge, Mass.



J.F. White Contracting Co. Newtonville, Massachusetts	Soil Samples at South Station Boston, Massachusetts	LOCATION PLAN
GEOTECHNICAL ENGINEERS INC. WINCHESTER • MASSACHUSETTS	Project 84091	October 18, 1984 Fig. 1

CLIENT	GEI
CLIENT ID	Sample #1
ERCO ID	13-7711 BN
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/10/84
RESULTS IN	ug/kg(ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRICRITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate ------	*
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate ----------	*
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate ----------	*
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	ND
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	ND
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	ND
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	ND
37B	1,2-diphenylhydrazine	ND	76B	chrysene	ND
39B	fluoranthene ----------	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	ND
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	ND
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene	ND
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	ND
54B	isophorone	ND	84B	pyrene ----------	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected.

NA = Not applicable.

*Below reporting limit of 270,000 ppb.

Reported by: 4r

Checked by: AKL

CLIENT	GEI
CLIENT ID	Sample #2
ERCO ID	13-7712
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/9/84
RESULTS IN	ug/kg(ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate	ND
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate	ND
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate	ND
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	ND
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	ND
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	ND
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	ND
37B	1,2-diphenylhydrazine	ND	76B	chrysene	ND
39B	fluoranthene ----------	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	ND
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	ND
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene	ND
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	ND
54B	isophorone	ND	84B	pyrene ----------	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected above the average reporting limit of 100,000 ppb.

NA = Not applicable.

*Trace concentrations detected below the average reporting limit.

Reported by: _____

Checked by: _____

CLIENT	GEI
CLIENT ID	Sample #3
ERCO ID	13-7713
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/9/84
RESULTS IN	ug/kg(ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate	ND
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate	ND
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate	ND
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	ND
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	ND
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	ND
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	ND
37B	1,2-diphenylhydrazine	ND	76B	chrysene	ND
39B	fluoranthene ----------	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	ND
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	ND
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene ----------	*
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	ND
54B	isophorone	ND	84B	pyrene ----------	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected above the average reporting limit of 290,000 ppb.

NA = Not applicable.

*Trace concentrations detected below the average reporting limit.

Reported by: AT

Checked by: [illegible]

CLIENT	GEI
CLIENT ID	Sample #4
ERCO ID	13-7714
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/10/84
RESULTS IN	ug/kg(ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate	ND
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate	ND
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate	ND
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	*
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	*
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	(a)*
37B	1,2-diphenylhydrazine	ND	76B	chrysene	*
39B	fluoranthene	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	ND
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	*
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene	*
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	ND
54B	isophorone	ND	84B	pyrene	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected above the average reporting limit of 47,000 ppb.

NA = Not applicable.

*Trace concentrations detected below the average reporting limit.

Reported by: AT

Checked by: [illegible]

(a) coelute

CLIENT	GEI
CLIENT ID	Sample #5
ERCO ID	13-7715
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/9/84
RESULTS IN	ug/kg(ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate	ND
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate	ND
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate	ND
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	ND
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	ND
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	ND
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	ND
37B	1,2-diphenylhydrazine	ND	76B	chrysene	ND
39B	fluoranthene ----------	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	ND
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	ND
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene ----------	*
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	ND
54B	isophorone	ND	84B	pyrene ----------	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected above the average reporting limit of 180,000 ppb.

NA = Not applicable.

*Trace concentrations detected below the average reporting limit.

Reported by: AT

Checked by: J.R.

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

BASE/NEUTRAL COMPOUNDS

CLIENT	GEI
CLIENT ID	Sample #6
ERCO ID	13-7716
SAMPLE RECEIVED	9/21/84
ANALYSIS COMPLETED	10/11/84
RESULTS IN	ug/kg(ppb)

1B	acenaphthene	ND	61B	N-nitrosodimethylamine	ND
5B	benzidine	ND	62B	N-nitrosodiphenylamine	ND
8B	1,2,4-trichlorobenzene	ND	63B	N-nitrosodi-n-propylamine	ND
9B	hexachlorobenzene	ND	66B	bis(2-ethylhexyl)phthalate	ND
12B	hexachloroethane	ND	67B	butyl benzyl phthalate	ND
18B	bis(2-chloroethyl)ether	ND	68B	di-n-butyl phthalate	ND
20B	2-chloronaphthalene	ND	69B	di-n-octyl phthalate	ND
25B	1,2-dichlorobenzene	ND	70B	diethyl phthalate	ND
26B	1,3-dichlorobenzene	ND	71B	dimethyl phthalate	ND
27B	1,4-dichlorobenzene	ND	72B	benzo(a)anthracene	*
28B	3,3-dichlorobenzidine	ND	73B	benzo(a)pyrene	*
35B	2,4-dinitrotoluene	ND	74B	3,4-benzofluoranthene	(a)*
36B	2,6-dinitrotoluene	ND	75B	benzo(k)fluoranthene	
37B	1,2-diphenylhydrazine	ND	76B	chrysene	*
39B	fluoranthene	*	77B	acenaphthylene	ND
40B	4-chlorophenyl phenyl ether	ND	78B	anthracene	*
41B	4/bromophenyl phenyl ether	ND	79B	benzo(ghi)perylene	*
42B	bis(2-chloroisopropyl)ether	ND	80B	fluorene	ND
43B	bis(2-chloroethoxy)methane	ND	81B	phenanthrene	*
52B	hexachlorobutadiene	ND	82B	dibenzo(a,h)anthracene	ND
53B	hexachlorocyclopentadiene	ND	83B	indeno(1,2,3-cd)pyrene	*
54B	isophorone	ND	84B	pyrene	*
55B	naphthalene	ND	129B	2,3,7,8-tetrachlorodibenzo-p-dioxin	ND
56B	nitrobenzene	ND			

ND = None detected above the average reporting limit of 25,000 ppb.

NA = Not applicable.

*Trace concentrations detected below the average reporting limit.

(a) coelute

Reported by: AT

Checked by: [illegible]

CHAIN OF CUSTODY RECORD

PROJ NO. 84291

PROJECT NAME South Station

SAMPLERS: (Signature) Michael S. Neley

SEA. NO.	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS							REMARKS
	9-24-04	1430		✓	Along center of all tunnel Rds	6							6 glass jars

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Michael S. Neley	9-24-04 15:15	Robert Wahlund			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Original Accompanies Shipment.

GEOTECHNICAL ENGINEERS INC.
1017 MAIN STREET · WINCHESTER · MASSACHUSETTS 01890 (617) 729-1625

PRINCIPALS
RONALD C. HIRSCHFELD
STEVE J. POULOS
DANIEL P. LA GATTA
RICHARD F. MURDOCK
GONZALO CASTRO

August 30, 1984
Project 84291

Mr. Steve Barlow
J.F. White Contracting Co.
One Gateway Center
Newton, MA 02158

Dear Steve:

Please find attached the results of the chemical analysis of 9 granular fill samples obtained at the South Station Intermodal Transportation. Laboratory results indicate that granular fill samples from the trackyard are free of USEPA priority pollutant volatile organic compounds, PCB's and pesticides. A trace of phenol (an acid organic extractable compound) was detected in one soil sample. Metal concentrations in leachate from the granular fill did not exceed the maximum contaminant levels specified by EPA.

Base/Neutral Extractable Compounds, most of which belong to a class of hydrocarbons refered to as Polynuclear Aromatic Hydrocarbons (PAH's) were detected in all granular fill samples collected by GEI. Concentrations of Base/Neutral Compounds, including PAH's ranged between 1.03 to 229.47 µg/g. (parts per million, (ppm). Only 3 samples contained greater than 100 ppm PAH's.

Pursuant to our discussion on August 23, regarding the renovation of VOC contaminated soil, the following amendment will be made to the Environmental Monitoring Program:

Page 6, Paragraph II, Item 5: shall read

Soil samples exhibiting VOC headspace concentrations between 10 and 100 ppm will be renovated on site and removed to a DEQE approved disposal site or used in on-site enbankments at the discretion of the contractor. Renovation of contaminated soils will entail spreading and aeration, until representative soil samples exhibit less than 10 ppm headspace concentration of VOC's.

Renovation will be conducted in areas isolated from people and adjacent dwellings.

Very truly yours,

GEOTECHNICAL ENGINEERS INC.

Margret M. Handley
Geologist

for Richard F. Murdock, P.E.
Principal

MMH/RFM/alm
attachments

Cambridge Analytical Associates
1106 Commonwealth Avenue / Boston, Massachusetts 02215 / (617) 232-2207

FORMAL REPORT OF ANALYSIS

PREPARED FOR: Geotechnical Engineers
1017 Main Street
Winchester, MA 01890
Attn: Margaret Hanley

CUSTOMER ORDER NUMBER: 84291

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

REPORT NUMBER: 84-899

DATE PREPARED: August 9, 1984

PREPARED BY: Keith A. Hausknecht
David L. Fiest

Cambridge Analytical Associates

TABLE OF CONTENTS

1. INTRODUCTION

This report summarizes results of chemical analyses performed on samples received by CAA on July 31, 1984. Analytical methods employed for these analyses are described in Section 2 and results are presented in Section 3. The last section contains certifications supporting the analytical results.

2. ANALYTICAL METHODS

Analytical methods utilized for sample analysis are summarized in Table 1. For analysis of EP toxicity, the sample was extracted according to methods specified by EPA (1982a). The leachate was then analyzed for metals according to methods of EPA (1979, 1982a).

3. RESULTS

Results of EP toxicity analyses are presented in Table 2. Concentrations of eight metals do not exceed the MCLs specified by EPA (1982a) and the sample is considered to be non-hazardous on the basis of EP toxicity.

Table 1. Summary of Analytical Methods

Constituent	Method Reference	Method Description
Metals		
Sample Preparation (EP toxicity)	Method 1310 (1)	EP test
Sb	Method 204.2 (1)	GFAAS
As	Method 206.2 (1)	GFAAS
Ba	Method 200.7 (1)	ICP
Be	Method 200.7 (1)	ICP
Cd	Method 213.1 (1)	FAAS
Cr	Method 200.7 (1)	ICP
Cu	Method 200.7 (1)	ICP
Pb	Method 239.1 (1)	FAAS
Hg	Method 245.1 (1)	Cold-vapor AAS
Ni	Method 200.7 (1)	ICP
Se	Method 270.2 (1)	GFAAS
Ag	Method 200.7 (1)	ICP
Tl	Method 279.2 (1)	GFAAS
Zn	Method 200.7 (1)	ICP
V	Method 200.7 (1)	ICP
Volatile Organic Compounds	Method 624 (2)	Purge and trap, gas chromatography/ mass spectrometry
Semivolatile Organics- Acid Extractables	Method 8240 (1)	Solvent extraction; capillary gas chromatography/mass spectrometry
Semivolatile Organics- Base/Neutral Extractables	Method 8240 (1)	Solvent extraction; capillary gas chromatography/mass spectrometry
Pesticides (PCBs)	Method 608 (3)	Solvent extraction; gas chromatography

(1)U.S. EPA. 1982a. Test Methods for Evaluating Solid Waste-Physical/Chemical Methods. SW-846. Office of Solid Waste, and Emergency Response, U.S. EPA, Washington, D.C.

(2)U.S. EPA. 1979. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020 (Revised, March 1983). EPA/EMSL, Cincinnati, Ohio.

(3)U.S. EPA. 1982b. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

GFAAS - Graphite furnace absorption spectrophotometry
FAAS - Flame atomic absorption spectrophotometry
ICP - Inductively coupled argon plasma emission spectrometry

Table 2. Results of EP Toxicity Analyses

Constituent	MCL[a]	Client ID: M1 CAA ID: 8405149	M2 8405150	M3 8405151	M4 8405152	M5 8405153
Sb (mg/l)	--	0.006; 0.007[a]	<0.005	<0.005	<0.005	<0.005
As (mg/l)	5.0	<0.05; <0.05[a]	<0.05	<0.05	<0.05	<0.05
Ba (mg/l)	100	0.07; 0.09[a]	0.04	0.05	0.10	0.06
Be (mg/l)	--	<0.01; <0.01[a]	<0.01	<0.01	<0.01	<0.01
Cd (mg/l)	1.0	<0.05; <0.05[a]	<0.05	<0.05	<0.05	<0.05
Cr (mg/l)	5.0	<0.05; 0.05[a]	<0.05	<0.05	<0.05	<0.05
Cu (mg/l)	--	<0.01; <0.01[a]	<0.01	<0.01	<0.01	<0.01
Pb (mg/l)	5.0	<0.5; <0.5[a]	<0.5	<0.5	<0.5	<0.5
Hg (mg/l)	0.2	<0.0005; <0.0005[a]	<0.0005	<0.0005	<0.0005	<0.0005
Ni (mg/l)	--	<0.05; <0.05[a]	<0.05	<0.05	<0.05	<0.05
Se (mg/l)	1.0	<0.005; <0.005[a]	<0.005	<0.005	<0.005	<0.005
Ag (mg/l)	5.0	<0.05; <0.05[a]	<0.05	<0.05	<0.05	<0.05
Tl (mg/l)	--	<0.005; <0.005[a]	<0.005	<0.005	<0.005	<0.005
Zn (mg/l)	--	0.11; 0.18[a]	0.07	0.16	0.40	0.19
V (mg/l)	--	<0.01; <0.01[a]	<0.01	<0.01	<0.01	<0.01

[a]EPA (1982a)

[b]Duplicate analyses performed.

Table 2 (cont'd). Results of EP Toxicity Analyses

Constituent	MCL[a]	Client ID:	M6	M7	M8	M9
		CAA ID:	8405154	8405155	8405156	8405157
Sb (mg/l)	--		0.02	0.006	<0.005	<0.005
As (mg/l)	5.0		<0.05	<0.05	<0.05	<0.05
Ba (mg/l)	100		0.22	0.13	0.09	0.12
Be (mg/l)	--		<0.01	<0.01	<0.01	<0.01
Cd (mg/l)	1.0		<0.05	<0.05	<0.05	<0.05
Cr (mg/l)	5.0		<0.05	<0.05	<0.05	<0.05
Cu (mg/l)	--		<0.01	<0.01	<0.01	<0.01
Pb (mg/l)	5.0		<0.5	<0.5	<0.5	<0.5
Hg (mg/l)	0.2		<0.0005	<0.0005	<0.0005	<0.0005
Ni (mg/l)	--		<0.05	<0.05	<0.05	<0.05
Se (mg/l)	1.0		<0.005	<0.005	<0.005	<0.005
Ag (mg/l)	5.0		<0.05	<0.05	<0.05	<0.05
Tl (mg/l)	--		<0.005	<0.005	<0.005	<0.005
Zn (mg/l)	--		1.0	0.31	0.17	0.17
V (mg/l)	--		<0.01	<0.01	<0.01	<0.01

[a] EPA (1982a)

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 3. Concentrations of Volatile Organic Compounds (Method 624[1])

Client: Geotechnical Engineers — Project No.: 84-099

Date Samples Received: July 31, 1984 — Reported By: EL

Date Analysis Completed: August 7, 1984 — Checked By: GF

Compound	Concentration (ug/kg wet weight basis)[2]					
Sample ID:	Composite 1A,B,C	Composite 2A,B,C	Composite 3A,B,C	Composite 4A,B	Composite 5A,B,C	Composite 6A,B
CAA ID:	8405140	8405141	8405142	8405143	8405144	8405145
(2v) acrolein						
(3v) acrylonitrile						
(4v) benzene						
(6v) carbon tetrachloride						
(7v) chlorobenzene						
(10v) 1,2-dichloroethane						
(11v) 1,1,1,-trichloroethane						
(13v) 1,1-dichloroethane						
(14v) 1,1,2-trichloroethane						
(15v) 1,1,2,2-tetrachloroethane						
(16v) chloroethane						
(19v) 2-chloroethylvinyl ether						
(23v) chloroform						
(29v) 1,1-dichloroethylene						
(30v) trans-1,2-dichloroethylene						
(32v) 1,2-dichloropropane						
(33v) trans-1,3-dichloropropene						
cis-1,3-dichloropropene						
(34v) ethylbenzene						
(44v) methylene chloride						
(45v) chloromethane						
(46v) bromomethane						
(47v) bromoform						
(48v) bromodichloromethane						
(49v) fluorotrichloromethane						
(50v) dichlorodifluoromethane						
(51v) chlorodibromomethane						
(85v) tetrachloroethylene						
(86v) toluene						
(87v) trichloroethylene						
(88v) vinyl chloride						
Detection Limit	100	4	5	5	4	125

[1] U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. [illegible]

[2] Concentrations less than the [illegible]

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 3 (cont'd). Concentrations of Volatile Organic Compounds (Method 624[1])

Client: Geotechnical Engineers — Project No.: 84-099

Date Samples Received: July 31, 1984 — Reported By: CL

Date Analysis Completed: August 7, 1984 — Checked By: EAF

Compound	Concentration in ug per liter (ppb)[2]		
Sample ID:	Composite 7A,B,C	Composite 8A,B,C	Composite 9A,B,C
CAA ID:	8405146	8405147	8405148
(2v) acrolein			
(3v) acrylonitrile			
(4v) benzene			
(6v) carbon tetrachloride			
(7v) chlorobenzene			
(10v) 1,2-dichloroethane			
(11v) 1,1,1,-trichloroethane			
(13v) 1,1-dichloroethane			
(14v) 1,1,2-trichloroethane			
(15v) 1,1,2,2-tetrachloroethane			
(16v) chloroethane.			
(19v) 2-chloroethylvinyl ether			
(23v) chloroform			
(29v) 1,1-dichloroethylene			
(30v) trans-1,2-dichloroethylene			
(32v) 1,2-dichloropropane			
(33v) trans-1,3-dichloropropene			
cis-1,3-dichloropropene			
(38v) ethylbenzene			
(44v) methylene chloride			
(45v) chloromethane			
(46v) bromomethane			
(47v) bromoform			
(48v) bromodichloromethane			
(49v) fluorotrichloromethane			
(50v) dichlorodifluoromethane			
(51v) chlorodibromomethane			
(85v) tetrachloroethylene			
(86v) toluene			
(87v) trichloroethylene			
(88v) vinyl chloride			
Detection Limit	1	3	10

[1] U.S. EPA. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EMSL-C, Cincinnati, Ohio.

[2] Concentrations less than the detection limit are less blank. Concentrations [illegible] and 10 times the detection limit are listed as [illegible]. Detection limits for acrylonitrile are 100 and 10 times the [illegible]

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 4. Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geotechnical Engineers

Report No.: 84-699

Date Samples Received: July 31, 1984

Reported By: AC

Date Analysis Completed: August 1, 1984

Checked By: JCF

Compound	Concentration - ug/g dry weight (ppm)[2]				
Sample ID:	ABN-1	ABN-2	ABN-3	ABN-4	ABN-5
CAA ID:	8405158	8405159	8405160	8405161	8405162
ACID COMPOUNDS					
(21A) 2,4,6-trichlorophenol					
(22A) p-chloro-m-cresol					
(24A) 2-chlorophenol					
(31A) 2,4-dichlorophenol					
(34A) 2,4-dimethylphenol					
(57A) 2-nitrophenol					
(58A) 4-nitrophenol					
(59A) 2,4-dinitrophenol					
(60A) 4,6-dinitro-2-methylphenol					
(64A) pentachlorophenol					
(65A) phenol					
4 methy phenol				0.40	
Detection Limit	0.13	0.12	0.09	0.07	0.08
BASE/NEUTRAL COMPOUNDS					
(1B) acenaphthene	4.5	1.1		6.4	
(5B) benzidine					
(8B) 1,2,4-trichlorobenzene					
(9B) hexachlorobenzene					
(12B) hexachloroethane					
(13B) bis (2-chloroethyl) ether					
(20B) 2-chloronaphthalene					
(25B) 1,2-dichlorobenzene					
(26B) 1,3-dichlorobenzene					
(27B) 1,4-dichlorobenzene					
(28B) 3,3'-dichlorobenzidine					
(35B) 2,4-dinitrotoluene					
(36B) 2,6-dinitrotoluene					
(37B) 1,2-diphenylhydrazine					
(39B) fluoranthene	30.	3.5	0.21	35.	0.21
(40B) 4-chlorophenyl phenyl ether					
(41B) 4-bromophenyl phenyl ether					

Table 4 (cont'd). Concentration of Acid/Base/Neutral Extractables (Method 625[1])

Client: Geotechnical Engineers — Report No.: 84-899

Date Samples Received: July 31, 1984 — Reported by: AS

Date Analysis Completed: August 1, 1984 — Checked by: [illegible]

Compound	Concentration - ug/g dry weight (ppm)[2]			
Sample ID: / CAA ID:	ABN-6 / 8405163	ABN-7 / 8405164	ABN-8 / 8405165	ABN-9 / 8405166
BASE NEUTRAL COMPOUNDS (cont'd)				
(42B) bis (2-chloroisopropyl) ether				
(43B) bis (2-chloroethoxy) methane				
(52B) hexachlorobutadiene				
(53B) hexachlorocyclopentadiene				
(54B) isophorone				
(55B) naphthalene	9.7	1.6		
(56B) nitrobenzene				
(62B) N-nitrosodiphenylamine				
(63B) N-nitrosodipropylamine				
(66B) bis (2-ethylhexyl) phthalate	8.6			
(67B) benzyl butyl phthalate				
(68B) di-n-butyl phthalate				
(69B) di-n-octyl phthalate				
(70B) diethyl phthalate				
(71B) dimethyl phthalate				
(72B) benzo(a)anthracene	4.3	13.		
(73B) benzo(a)pyrene	5.0	14.		
(74B) benzo(b)fluoroanthene	5.0	5.5		
(75B) benzo(k)fluoroanthene	5.0	7.9		
(76B) chrysene	4.0	8.7		
(77B) acenaphthylene		0.68		
(78B) anthracene		7.0	0.12	0.21
(79B) benzo(ghi)perylene		5.3		
(80B) fluorene	5.9	3.1		
(81B) phenanthrene	20.	25.	0.30	0.64
(82B) dibenzo(a,h)anthracene		3.5		
(83B) indeno(1,2,3-cd)pyrene		5.3		
(84B) pyrene	10.	26.	0.32	0.27
Detection Limit	0.43	0.64	0.38	0.11

[1] U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/EMSL, Cincinnati, Ohio.

[2] Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times the limit of detection are listed as trace levels (TR).

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

Table 5 (cont'd). Concentration of Pesticides and PCBs (Method 608[1])

Client: Geotechnical Engineers — Report No.: 84-499

Date Samples Received: July 31, 1984 — Reported by: SND

Date Analysis Completed: August 1, 1984 — Checked by: CTL

Compound	Concentration - ug/l dry weight (ppm)[2] Sample ID: ABN-6 CAA ID: 8405163	ABN-7 8405164	ABN-8 8405165	ABN-9 8405166
PESTICIDES AND PCBs				
(89P) aldrin				
(90P) dieldrin				
(91P) chlordane				
(92P) 4,4'-DDT				
(93P) 4,4'-DDE				
(94P) 4,4'-DDD				
(95P) endosulfan-alpha				
(96P) endosulfan-beta				
(97P) endosulfan sulfate				
(98P) endrin				
(99P) endrin aldehyde				
(100P) heptachlor				
(101P) heptachlor epoxide				
(102P) BHC-alpha				
(103P) BHC-beta				
(104P) BHC-delta				
(105P) BHC-gamma (lindane)				
(106P) PCB - 1242				
(107P) PCB - 1254				
(108P) PCB - 1221				
(109P) PCB - 1232				
(110P) PCB - 1248				
(111P) PCB - 1260				
(112P) PCB - 1016				
(113P) toxaphene				
Detection Limit	0.01	0.01	0.01	0.01

[1] U.S. EPA, 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater. EPA 600/4-82-057. EPA/CMSL, Cincinnati, Ohio.

[2] Concentrations less than the detection limit are left blank. Concentrations between 1 and 10 times detection limit are listed as trace levels (Tr).

4. QUALITY ASSURANCE DOCUMENTATION

Certification

This work has been checked for accuracy by the following staff personnel:

Director, Inorganic
Chemistry Laboratory

Keith A. Hausknecht

Director, Organic
Chemistry Laboratory

David L. Fiest

ENCO | Energy Resources Co. Inc.

203 Alewife Brook Parkway
Cambridge, Massachusetts 02138
(617) 661-3111

July 20, 1984

Ms. Margaret Hanley
Geotechnical Engineers, Inc.
1017 Main Street
Winchester, MA 01890

Dear Margaret:

Enclosed are the final results for the analyses performed on the six sediment samples for project #84291 received on July 9, 1984. I hope the lateness of this report has not caused you any inconvenience.

If there any questions concerning these data, I would be happy to answer them for you. I can be contacted at 661-3111.

Sincerely,

Robert Watkins

Robert Watkins
Inorganic Laboratory
Manager

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	B-3
ERCO ID	5413
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRICRITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 5500 ppb.

Reported by: LG

Checked by: K...

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-1
ERCO ID	5414
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 440 ppb.

Reported by: LG

Checked by: K

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-2 (Duplicate)
ERCO ID	5435D
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 4800 ppb.

Reported by: LG

Checked by: K.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	B-2
ERCO ID	5412
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/13/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 3 ppb for 601 and 48 ppb for 602.

*Trace concentrations detected below the average reporting limit.

Reported by: JFM
Checked by: WS

Unknown Peaks 601 0

Unknown peaks 602 3

Concentration unknowns 601 ND

Unknown concentration 602 2,200

Unknown concentration based on average response factor.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	B-3
ERCO ID	5413
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/13/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 2.5 ppb for 601 and 400 ppb for 602.

*Trace concentrations detected below the average reporting limit.

Reported by: JPM
Checked by: MS

Unknown Peaks 601 0 Unknown peaks 602 ____

Concentration unknowns 601 ND Unknown concentration 602 ____

Unknown concentration based on average response factor.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-1
ERCO ID	5414
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/13/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 1.6 ppb for 601 and 51 ppb for 602.

*Trace concentrations detected below the average reporting limit.

Reported by: JFM
Checked by: NS

Unknown Peaks 601 0

Unknown peaks 602 5

Concentration unknowns 601 ND

Unknown concentration 602 450

Unknown concentration based on average response factor.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-2
ERCO ID	5415
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/14/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 3 ppb for 601 and 49 ppb for 602.

Reported by: JFM
Checked by: KS

Unknown Peaks 601 0

Concentration unknowns 601 ND

Unknown peaks 602 4

Unknown concentration 602 1,800

Unknown concentration based on average response factor.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-3
ERCO ID	5416
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/14/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 2.5 ppb for 601 and 50 ppb for 602.

Reported by: JFM
Checked by: KS

Unknown Peaks 601 0

Unknown peaks 602 4

Concentration unknowns 601 ND

Unknown concentration 602 800

Unknown concentration based on average response factor.

Sample Received: 7/9/84

Analysis Completed: 7/16/84

All Results in: ug/g (ppm) dry wt.

Reported by: CAK

Checked by: LAS

ERCO / ENERGY RESOURCES CO. INC.

INORGANIC ANALYSIS

- Data Report -

Client: Geotechnical Engineers, Inc.

ERCO ID	CLIENT ID	Ag	As	Be	Cd	Cr	Cu	Hg	Ni
5411	B-1	<0.24	14	<0.24	<0.24	21	79	0.29	7.5
5412	B-2	<0.22	4.2	<0.21	<0.21	13	59	0.007	3.2
5413	B-3	<0.24	14	0.32	<0.23	20	21	0.056	11
5414	TP-1	0.27	6.4	<0.22	<0.22	10	15	0.30	5.6
5415	TP-2	<0.23	14	<0.21	<0.21	15	30	1.2	9.7
5416	TP-3	0.51	20	<0.28	<0.28	30	150	6.3	13

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

Sample Received: 7/9/84

Analysis Completed: 7/16/84

All Results in: ug/g (ppm) dry wt.

Reported by: CAK

Checked by: LAS

ERCO / ENERGY RESOURCES CO. INC.

INORGANIC ANALYSIS

- Data Report -

Client: Geotechnical Engineers, Inc.

ERCO ID	CLIENT ID	Pb	Sb	Se	Tl	V	Zn	% Solids
5411	B-1	160	<1.2	<1.2	<1.2	20	78	81.9
5412	B-2	20	<1.0	<1.1	<1.1	10	140	89.8
5413	B-3	21	<1.2	<1.2	<1.2	22	66	72.8
5414	TP-1	170	<1.1	<1.1	<1.1	11	48	88.4
5415	TP-2	140	<1.1	<1.2	<1.2	17	72	83.9
5416	TP-3	710	<1.4	<1.5	<1.5	26	420	64.6

If customer has any questions regarding analysis, refer to sample in question by its ERCO ID#.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-1
ERCO ID	5414
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 440 ppb.

Reported by: LG

Checked by: K

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-2
ERCO ID	5415
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 500 ppb.

Reported by: LG

Checked by: K

ERCO / ENERGY RESOURCES CO. INC.

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-3
ERCO ID	5416
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 700 ppb.

Reported by: LG

Checked by: K

CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-2 (Duplicate)
ERCO ID	5435D
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRIORITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	ND
24A	2-chlorophenol	ND
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	ND
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	ND

ND = None detected above the average reporting limit of 4800 ppb.

Reported by: LG

Checked by: KL

[redacted] Geotechnical Engineers, Inc. [redacted]

[redacted] ID	3-T
CLIENT	Geotechnical Engineers, Inc.
CLIENT ID	TP-3 (Spiked)
ERCO ID	54365
SAMPLE RECEIVED	7/9/84
ANALYSIS COMPLETED	7/16/84
RESULTS IN	ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

ORGANIC PRICRITY POLLUTANT ANALYSIS

ACID COMPOUNDS

21A	2,4,6-trichlorophenol	ND
22A	p-chloro-m-cresol	4,000 (106% rec.)
24A	2-chlorophenol	3,800 (100% rec.)
31A	2,4-dichlorophenol	ND
34A	2,4-dimethylphenol	ND
57A	2-nitrophenol	ND
58A	4-nitrophenol	9,000 (240% rec.)
59A	2,4-dinitrophenol	ND
60A	4,6-dinitro-o-cresol	ND
64A	pentachlorophenol	ND
65A	phenol	3,500 (82% rec.)

ND = None detected above the average reporting limit of 7,400 ppb.

Reported by: LG

Checked by: K

CLIENT Geotechnical Engineers, Inc.
CLIENT ID B-1
ERCO ID 5411
SAMPLE RECEIVED 7/9/84
ANALYSIS COMPLETED 7/13/84
RESULTS IN ng/g (ppb)

ERCO / ENERGY RESOURCES CO. INC.

VOLATILE COMPOUNDS

EPA 601 AND 602 METHODS

	601 COMPOUNDS		602 COMPOUNDS	
45V	Chloromethane	ND	Benzene	ND
46V	Bromomethane	ND	Toluene	ND
88V	Vinyl chloride	ND	Ethyl Benzene	ND
16V	Chloroethane	ND	P-Xylene	ND
44V	Methylene chloride	ND	M-Xylene	ND
29V	1,1-dichloroethylene	ND	O-Xylene	ND
13V	1,1-dichloroethane	ND	Styrene	ND
30V	1,2-trans-dichloroethylene	ND	N-Propylbenzene	ND
23V	Chloroform	ND	O-Chlorotoluene	ND
10V	1,2-dichloroethane	ND	Trimethyl Benzene	ND
11V	1,1,1-trichloroethane	ND	P-Dichlorobenzene	ND
6V	Carbon tetrachloride	ND	M-Dichlorobenzene	ND
48V	Bromodichloromethane	ND	N-Butylbenzene	ND
32V	1,2-dichloropropane	ND	O-Dichlorobenzene	ND
33V	Trans-1,3-dichloropropylene	ND	1,2,4-Trichlorobenzene	ND
87V	Trichloroethylene	ND		
51V	Dibromochloromethane	ND		
33V	Cis-1,3-dichloropropylene	ND		
14V	1,1,2-trichloroethane	ND		
47V	Bromoform	ND		
15V	1,1,2,2-tetrachloroethane	ND		
85V	Tetrachloroethylene	ND		
7V	Chlorobenzene	ND		
19V	2-chloroethyl vinyl ether	ND		

ND = Not detected above the average reporting limit of 2.5 for 601 and 200 for 602.

*Trace concentrations detected below the average reporting limit.

Reported by: JFM
Checked by: NJS

Unknown Peaks 601 0

Concentration unknowns 601 ND

Unknown peaks 602 5

Unknown concentration 602 18.000

Unknown concentration based on average response factor.